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Case Report

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Fixation of Comminuted Patella Fracture with Patella Plate and Cerclage Wiring

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Abstract

Introduction: The patella is the largest sesamoid bone of the human skeleton. It is integrated into the extensor apparatus and with its articular surface, it is also a component of the patellofemoral joint. Patella fractures account for 1% of all fractures.

Comminuted fractures of the patella which disrupt the extensor mechanism of the knee require surgery. The aim of the treatment is to preserve the bone of the patella, restore the joint surface and provide stable fixation for early mobilization. Since partial or total patellectomy results in the loss of quadriceps muscle power, it should be avoided if possible.

Case Presentation: 36 years old Sudanese gentleman presented to our department after involving in RTA with right side knee pain, the x ray of the right knee showed comminuted patella fracture.

We decided to preserve the patella, then we did an open reduction internal fixation with patella plate and cerclage wiring.

Conclusion: Salvage procedure for severely comminuted patella fracture has a successful functional outcome following a good fixation of fragments and early rehabilitation and it may be preferred over partial or total patellectomy.

Keywords: Comminuted patella fracture, extensor mechanism, patella plate

Introduction

The patella is the largest sesamoid bone of the human skeleton. It is integrated into the extensor apparatus and with its articular surface, it is also a component of the patellofemoral joint (1).

The patella serves as the fulcrum for the extensor mechanism between the quadriceps tendon and the patellar tendon. Forces transmitted across the femoropatellar joint can reach up to three to seven time's body weight (1).

Patellar fracture is a commonly caused by excessive tension through the extensor mechanism or a direct blow. The intact patella increases the leverage and efficiency of the extensor mechanism and articulates with the femoral trochlea. Patellar fractures may result in stiffness, weakness in extension, and patellofemoral arthritis (2).

Patella fractures account for 1% of all fractures (3).

Comminuted fractures of the patella which disrupt the extensor mechanism of the knee require surgery. The aim of the treatment is to preserve the bone of the patella, restore the joint surface and provide

stable fixation for early mobilization. Since partial or total patellectomy results in the loss of quadriceps muscle power, it should be avoided if possible (4).

Treatment options vary based on fracture displacement, classification, and patient factors. Traditionally, nonoperative treatment has been reserved for nondisplaced fractures. Many operative treatments are available with differing indications and levels of success. Tension band constructs have been the most commonly employed approach to fixation, with cerclage wiring for comminuted fractures (3).

Patellar fixation with a standard anterior tension band construct is best suited for transverse fractures. In the setting of comminution or multiple fracture lines, screw(s), plate(s), or cerclage wire fixation is therefore often utilized to aid reconstruction (5).

Case Presentation

Our case is 36 years old Sudanese gentleman presented to our department after involving in RTA, with right side knee pain, swelling and unable to bear weight.

On examination

The patient was on pain

Vital signs within normal and other systemic examination was normal.

Local examination revealed swelling, tenderness, crepitus over the right knee, the patient unable to perfume straight leg raising test.

After full assessment and evaluation the imaging was requested, the x ray of the right knee showed comminuted patella fracture.

For more confirmation and pre-operative planning the CT scan was requested and performed.

After discussion we decided to preserve the patella and to do an open reduction internal fixation with patella plate and cerclage wiring.

Preoperative investigations were within normal ranges.

Later the operation was done under spinal anesthesia, patient was put in supine position, anterior midline knee incision was used then open reduction and internal fixation with patella plate and cerclage was applied and checked intraoperatively with image intensifier.

After the operation the patient referred to physiotherapy department and started weight bearing with knee support and walker.

Figure 1: Plain radiograph of the right knee AP veiw shows multi-fragmented patella.

Figure 2: Plain radiograph of the right knee lateral view shows multi-fragmented patella.

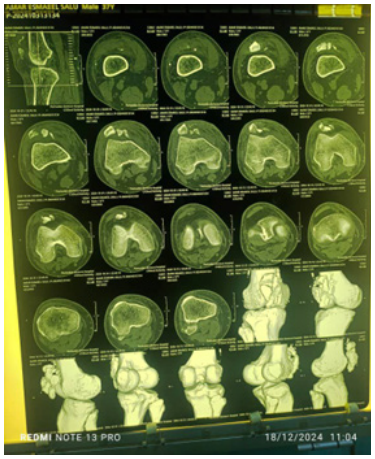

Figure 3: CT scan of the right knee, axial and 3D views show multi-fragmented patella.

Figure 4: CT scan of the right knee sagittal view show multi-fragmented patella.

Figure 5: Patella plate.

Figure 6 & 7: Patella plate intraoperatively after fracture reduction.

Figure 8: Intra-operative lateral knee radiograph taken with image intensifier shows reduction of the fragments with reduction clamp and application of plate.

Figure 9: Post-operative plain radiograph show fixation of the Patella with plate and cerclage wiring.

Discussion

Patellar comminuted fracture is a great challenge for clinical orthopedic surgeons. The main challenge is that sometimes, it is difficult to obtain anatomical reduction and rigid internal fixation, resulting in poor functional outcome (6).

The treatment of cornminuted displaced fractures of the patella has been a matter of controversy for a century and still evokes disagreement in everyday surgical practice. Acceptable results cannot be obtained by conservative means but no agreement exists about the choice of the operative method. The cornminuted fractures of the patella are a heterogeneous group of injuries in which the surgeon has to decide how much of the fractured patella can be and how much should be spared (7).

The majority of patella fractures are transverse and amenable to fixation with a combination of tension-band wiring and ORIF using screws or Kirschner wires (K-wires). However, not all fracture patterns are easily treated with this gold standard, especially in the comminuted fractures (8).

A variety of fixation techniques with varying success have been employed to fix the patella, including K-wire tension banding, interfragmentary screws, and cerclage wiring .

Furthermore, as the severity of comminution increases, the surgeon may hesitate to fix the fragment and be forced to consider complete or partial patellectomy, which is generally regarded as a salvage procedure due to poor functional outcomes (8).

Disruption of the extensor mechanism can be divided into bony or soft tissue causes, due to either patella fracture as in our case or quadriceps and patella tendon ruptures caused by direct or indirect trauma (9).

The most common complication after patella fracture and operation is decrease knee motion, other expected complications are infections, delayed or nonunion, patellafemoral osteoarthritis, and prominent hardware, failure of fixation, device migration and postoperative pain (10).

The clinical and radiological outcome of patellar fractures is vary considerably. Although predictable union rates have been achieved, little is known about the functional outcome, quality of life and lower extremity function.

In our case we choose the fixation of patella fracture with plate and cerclage, we think that it was a good option in such case rather than to do partial patellectomy.

Conclusion

Salvage procedure for severely comminuted patella fracture has a successful functional outcome following a stable fixation of fragment and early rehabilitation and hence may be preferred over partial or total patellectomy. This provides a better clinical outcome, restoration of anatomy and improvement of extensor mechanism.

Newer devices like patella plate in our case allows for earlier rehabilitation and return to function while insuring high union rates.

Consent

Patient consent was obtained and preserved by the authors.

Abbreviations

CT: Computed tomography

ORIF: Open reduction and internal fixation

RTA: Road traffic accident

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